

**ABSTRACT**

A process for the synthesis of carbon coatings on the surface of metal carbides, preferably SiC, by etching in a halogen-containing gaseous etchant, and optionally hydrogen gas, leading to the formation of a carbon layer on the metal carbide. The reaction is performed in gas mixtures containing 0 to two moles of hydrogen for every two moles of halogen gas, preferably about 0.5 to one mole of hydrogen gas for every two moles of halogen gas, at temperatures from about 100° C to about 4,000° C, preferably about 800° C to about 1,000° C, over any time range, maintaining a pressure of preferably about one atmosphere.